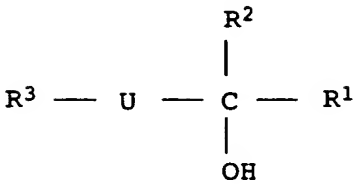
We claim:

1. A process for the preparation of a compound of the general formula I



I

where R^1, R^2, R^3 are hydrogen, C_1- to C_{20}-alkyl, C_2- to C_{20}-alkenyl, C_2- to C_{20}-alkynyl, C_3- to C_{12}-cycloalkyl, C_4- to C_{20}-cycloalkyl-alkyl, C_1- to C_{20}-hydroxyalkyl, or aryl or C_7- to C_{20}-arylalkyl which is unsubstituted or substituted by C_1- to C_8-alkyl, C_1- to C_8-alkoxy, halogen, C_1- to C_4-haloalkyl, C_1- to C_4-haloalkoxy, phenyl, phenoxy, halophenyl, halophenoxy, carboxyl, C_2- to C_8-alkoxycarbonyl or cyano, or R^1 and R^2 or R^3 together are a C_2- to C_9-alkandiyl unit which is unsubstituted, monosubstituted or disubstituted by C_1- to C_8-alkyl, C_1- to C_8-alkoxy and/or halogen and in which one or two methyl groups may also be replaced by a (CH=CH) unit and R^3 is additionally an acetylated carbonyl group in which the alkoxy groups are derived from an alcohol of the general formula II

$$R^4\text{-OH} \qquad \text{II}$$

where R^4 is C_1- to C_6-alkyl, and

U is an acetylated carbonyl group in which the alkoxy groups are derived from an alcohol of the general formula II, or is a compound of the general formula III

$$R^3\text{—}V\text{—}W\text{—}R^1 \qquad \text{III}$$

where R^1 is as defined under the formula I, and R^3 is exclusively aryl which is unsubstituted or substituted by C_1- to C_8-alkyl, C_1- to C_8-alkoxy, halogen, C_1- to C_4-haloalkyl, C_1- to C_4-haloalkoxy, phenyl, phenoxy, halophenyl, halophenoxy, carboxyl, C_2- to C_8-alkoxycarbonyl or cyano,

V is a carbonyl group or is as defined for U under the formula I, and

W is as defined for V, with the proviso that one of the groups V and W is a carbonyl group and the other is an acetylated carbonyl group,

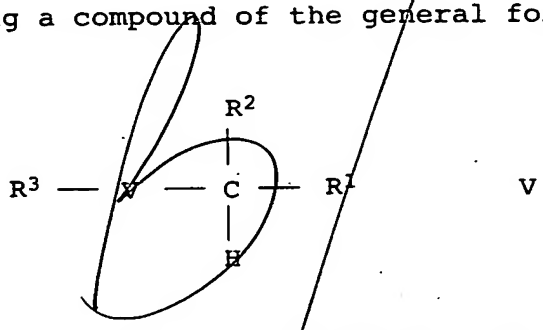
or

a compound of the general formula IV

$$R^3—V—W—O—R^4 \qquad IV$$

where R^4 is as defined under the formula II, V and W are as defined under the formula II, and R^3 is as defined under the formula III,

by subjecting a compound of the general formula V



V

where V, R^1, R^2 and R^3 are as defined under the formula I or III, with the proviso that

- in the case where a compound of the formula III is desired, use is only made of a compound Va in which

  R^1 is exclusively hydrogen and

  R^3 is exclusively aryl which is unsubstituted or substituted by C_1- to C_8-alkyl, C_1- to C_8-alkoxy, halogen, C_1- to C_4-haloalkyl, C_1- to C_4-haloalkoxy, phenyl, phenoxy, halophenyl, halophenoxy, carboxyl, C_2- to C_8-alkoxycarbonyl or cyano, and

- in the case where a compound of the formula IV is desired, use is only made of a compound Vb in which

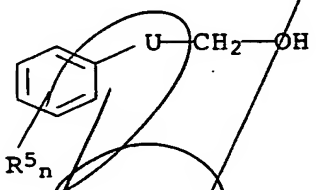
  R^1 and R^2 are exclusively hydrogen,

  R^3 is exclusively aryl which is unsubstituted or substituted by C_1- to C_8-alkyl, C_1- to C_8-alkoxy, halogen, C_1- to C_4-haloalkyl, C_1- to C_4-haloalkoxy,

phenyl, phenoxy, halophenyl, halophenoxy, carboxyl, C_2- to C_8-alkoxycarbonyl or cyano,

to an electrochemical reaction with an alcohol of the general formula II in the presence of an auxiliary electrolyte and catalytic amounts of a metal salt (S) derived from a metal from the 1st, 2nd, 6th or 8th sub-group or from lead, tin or rhenium.

2. A process as claimed in claim 1 for the preparation of a compound of the general formula Ia



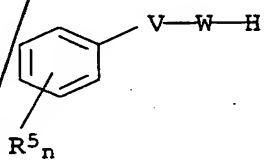
Ia

where U is as defined under the formula I,

n is 0, 1, 2 or 3, and

R^5 is C_1- to C_8-alkyl, C_1- to C_8-alkoxy, halogen, C_1- to C_4-haloalkyl, C_1- to C_4-haloalkoxy, phenyl, phenoxy, halophenyl, halophenoxy, carboxyl, C_2- to C_8-alkoxycarbonyl or cyano,

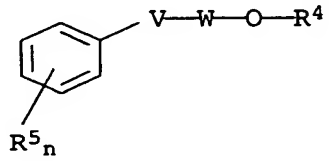
or of the general formula IIIa



IIIa

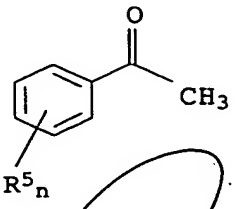
where n, V, W and R^5 are as defined under the formula Ia or III,

or of the general formula IVa



IVa

where n, V, W, R^4 and R^5 are as defined under the formula Ia or IIIa, by employing, as starting compound of the general formula V, a compound of the general formula Va,



Va

where n and R^5 are as defined under the formula Ia.

3. A process as claimed in claim 2, where the compound of the general formula Ia is 2-phenyl-2,2-dimethoxyethanol, the compound of the general formula IIIa is 2-phenyl-2,2-dimethoxyacetaldehyde or 2-phenylglyoxal dimethyl acetal, the compound of the general formula IVa is phenylglyoxylic acid methyl orthoester, and the compound of the general formula Va is acetophenone.

4. A process as claimed in claim 1, where the compound of the general formula I is a compound of the general formula Ib

$$H_{2m}C_m\text{-}CHOH\text{-}CH_2(OR^4)_2 \qquad \text{Ib}$$

where m is a number from 1 to 10, and R^4 is as defined under the formula II, and the compound of the general formula V is a compound of the general formula Vb

$$H_{2m}C_m\text{-}CH_2\text{-}CHO \qquad \text{Vb.}$$

5. A process as claimed in any one of claims 1 to 4, where the compound of the formula I is 2,2,3,3-tetramethoxypropanol, and the starting compound employed is methylglyoxal dimethyl acetal.

6. A process as claimed in any one of claims 1 to 5, where the anions of the metal salt (S) are derived from mineral acids.

7. A process as claimed in any one of claims 1 to 6, where the anions of the metal salt (S) are phosphate, sulfate, nitrate, perchlorate or halide.

8. A process as claimed in any one of claims 1 to 7, where the cations of the metal salt (S) are iron, nickel, platinum, palladium, cobalt, zinc, silver or copper.

9. A process as claimed in any one of claims 1 to 8, where the electrolysis liquid contains from 1 to 1000 ppm by weight of metal ions of the metal salt (S), based on the total amount of electrolysis liquid.

10. A process as claimed in any one of claims 1 to 9, where the electrolysis liquid contains a halogen-containing auxiliary electrolyte.

11. A process as claimed in any one of claims 1 to 10, where the electrolysis liquid essentially consists of

- a starting compound of the general formula V
- an alcohol of the general formula II
- a halogen-containing auxiliary electrolyte
- catalytic amounts of the metal salt (S)
- possibly the desired products of the general formulae I, III and IV
- possibly other by-products of electrolysis which are derived from the compounds of the general formulae I, II, III, IV and V, and
- if desired, other conventional co-solvents.

12. A process as claimed in any one of claims 1 to 11, where

- the proportion of the starting compounds and products of the general formulae I, III, IV and V and of the other by-products of electrolysis from the abovementioned compounds is from 1 to 70% by weight,
- the proportion of the alcohol of the general formula II is from 14.9 to 94.9% by weight,
- the proportion of auxiliary electrolyte is from 0.1 to 5% by weight, and

- the proportion of any co-solvents present is from 0 to 70% by weight,

based on the electrolysis liquid.

13. A process as claimed in any one of claims 1 to 12, where the electrolysis is carried out in an undivided electrolysis cell.

14. A process as claimed in any one of claims 1 to 13, where the anodes employed are made of noble metals, noble-metal oxides, graphite or carbon materials, and the cathodes employed are made of iron, steel, nickel, zinc, noble metals, graphite or carbon materials.

Sub A1

add B5